Radiomic Features on CT are Prognostic of Recurrence as well as Predictive of Added Benefit of Adjuvant Chemotherapy in ES-NSCLC

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Background: Early-stage non-small cell lung cancer (ES-NSCLC) accounts for approximately 40% of NSCLC cases, with 5-year survival rates varying between 31-49%. The decision to offer adjuvant chemotherapy for these patients is primarily dependent on several clinical and visual radiographic factors as there is a lack of biomarkers which can accurately stratify and predict disease risk. Method: Retrospective chart review between 2005-14 yielded 315 ES-NSCLC patients who underwent surgery with the primary tumor having relapsed in 75 cases. From the entire cohort, 74 underwent adjuvant chemotherapy. This cohort was randomly divided into a training (N=60) and validation (N=255). A total of 248 intratumoral (IT) and peritumoral (PT) radiomic textural features were extracted for every patient. The most stable, significant and uncorrelated features were selected from training cohort using LASSO Cox-regression model. Performance of imaging features was evaluated using hazard ratio (HR) and concordance index (CI). Linear Discriminant Classifier (LDA) was trained using top imaging features and performance of predicted labels was assessed using Kaplan-Meier survival curves and log-rank test. Result: Top nine radiomic textural features (from the Haralick, Collage, Laws, Gabor texture families) included a combination of four IT and five PT from 0-12mm distance outside the nodule. The features were prognostic of recurrence (N=255, CI=0.66, HR=1.8, p<0.05). To evaluate the predictive model, subset analysis was performed on the test set. The imaging feature based classifier was able to identify low and high risk groups in the surgery alone setting (N=181, CI=0.73, HR=4.4, p<0.005), potentially identifying patients who might have benefitted from adjuvant chemotherapy. Meanwhile, in the group of patients who received adjuvant chemotherapy following surgery, the classifier did not identify any difference between high and low risk groups (N=74, CI=0.69, HR=1, p>0.05). Conclusion: We identified radiomic features from within and outside lung nodule that were prognostic of recurrence and also predictive of added benefit of adjuvant chemotherapy in ES-NSCLC. Keywords: NSCLC, adjuvant-chemotherapy, Radiomics

Pattern of Recurrence of Completely Resected Lung Adenocarcinoma Varies According to EGFR Mutation Status

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Background: The prognostic significance of epidermal growth factor receptor (EGFR) mutations in resectable lung adenocarcinoma is not well defined. We evaluated the influence of EGFR mutation status on postoperative recurrence timing with the use of event dynamics. Method: A total of 644 patients with lung adenocarcinoma who underwent complete resection and examined for EGFR mutation status between 2008 and 2015 were studied. Disease-free survival (DFS) were calculated using the Kaplan-Meier method and compared between EGFR mutation-positive patients (n=322) and EGFR wild-type patients (n=322). Event dynamics, based on the hazard rate, were evaluated and only first events (distant metastases or local recurrence) were considered. Result: There was no statistical significance in recurrence rate (9.9% versus 14.6%; p=0.09) between EGFR mutation-positive patients and EGFR wild-type patients. Patients with pathological stage I, DFS was significantly better in the EGFR mutant group than the wild-type group (p=0.009), whereas the EGFR mutant group had an inferior DFS compared with the wild-type group among patients with pathological stage II or higher (p=0.110). The resulting hazard rate curves indicated that the recurrence risk pattern was definitely correlated with EGFR mutation status, with an early highest peak during the first year for EGFR wild-type patients and a late maximum peak in the fifth year for EGFR mutation-positive patients. Conclusion: The prognostic value of EGFR mutations appears to be different according to pathological stage in completely resected adenocarcinoma. The hazard and the peak times of recurrence differ considerably between EGFR-mutant and wild-type patients. Keywords: EGFR, Surgery, recurrence dynamics

Standard Conventional Lobectomy vs Stereotactic Body Radiotherapy in Patients with Early Stage Non-Small Cell Lung Cancer (NSCLC) — A Review

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